United States Department of Agriculture

Fox Hollow Project

Environmental Assessment

Forest Service **Land Between the Lakes National Recreation Area** **September 2017**

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Introduction

We propose to improve watershed conditions in the 560 acres of Fox Hollow at Land Between the Lakes National Recreation Area. We propose to block access to user made sites to prevent watershed damage caused by erosion, close Road 382, cut and leave trees along edges of Road 220 to promote drying of the road surface and maintain Roads 219 and 220 in Fox Hollow.

We prepared this environmental assessment to determine whether effects of the proposed activities may be significant enough to prepare an environmental impact statement. By preparing this environmental assessment, we meet agency policy and direction to comply with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. For more details of the proposed action, see the "Alternatives" section of this document page 9.

Location of the Proposed Project Area

Fox Hollow encompasses a 560-acre area containing about 45 of acres pine stands, 490 acres of hardwood stands, and 25 acres of open lands. Located eight miles north of U.S. Highway 79, east of the Woodlands Trace between Forest Service Roads 219, 382, and 220, Fox Hollow's eastern boundary touches Lake Barkley's shoreline. Please reference the vicinity map in Figure 1. Vicinity map.

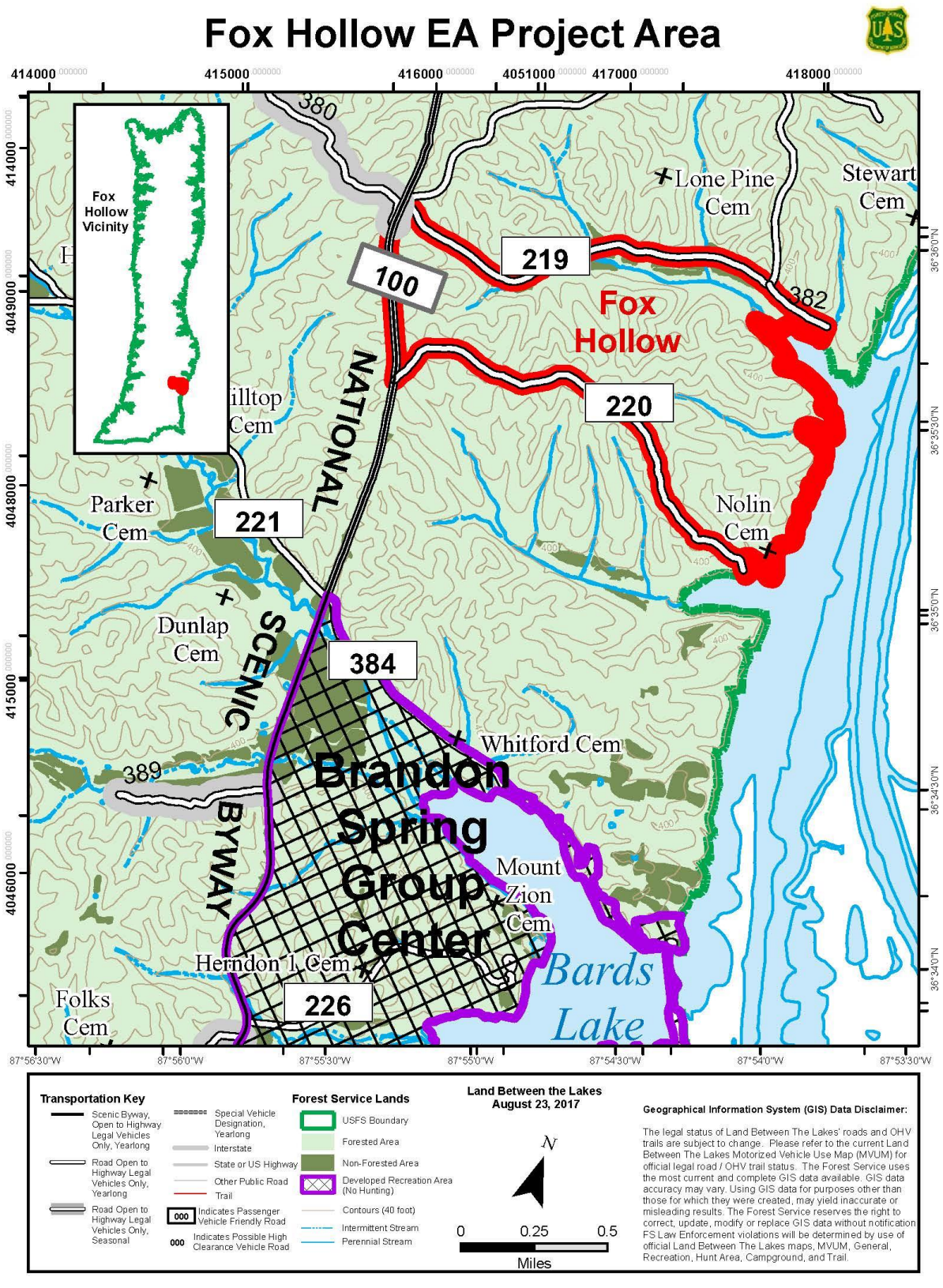

Figure 1. Vicinity map

Need for the Proposal

We collaborated with the community to identify potential needs in the Fox Hollow project area. Input centered on recreation opportunities, roads maintenance, heritage sites, wildlife habitat and soil and water issues.

The project area contains highly erosive soils and steep slopes. Extensive mitigations would be needed if we removed the pine stands or harvested in the hardwood stands in Fox Hollow. The current conditions of the project area are briefly described in this section. The *Fox Hollow Team Assessment, February 2017* in the project record describes details about the Fox Hollow area and contains maps. For additional background, see the scoping letters and summaries contained in the project record.

Recreation

No facilities currently exist in the Fox Hollow area. Evidence indicates visitors use access roads to reach the shoreline and to camp. Forest Service staff identified six user-made dispersed campsites and user-made accesses in the project area. See the map in Figure 2. One site is located off Road 219, one site off Road 382, and four sites off Road 220. The user-made accesses to sites 382A, 220A, and 220C and beyond 220B are causing erosion. These accesses either need to be adopted as official Forest Service roads or blocked and restored. Sites 220B and 220D are within approved roadside parking limitations and may need to be blocked and restored if resource damage occurs.

Visitors recreate with four-wheel drive vehicles on the shoreline off Road 382. This causes rutting and erosion of the mudflat. Visitors damage the lakeshore off Road 220 when they launch boats. The shoreline erosion impacts fishing, wildlife habitat, and scenic quality.

Hunters utilize Fox Hollow and the road network in the area. Visitors travel along the routes to enjoy scenic driving and engage in wildlife viewing.

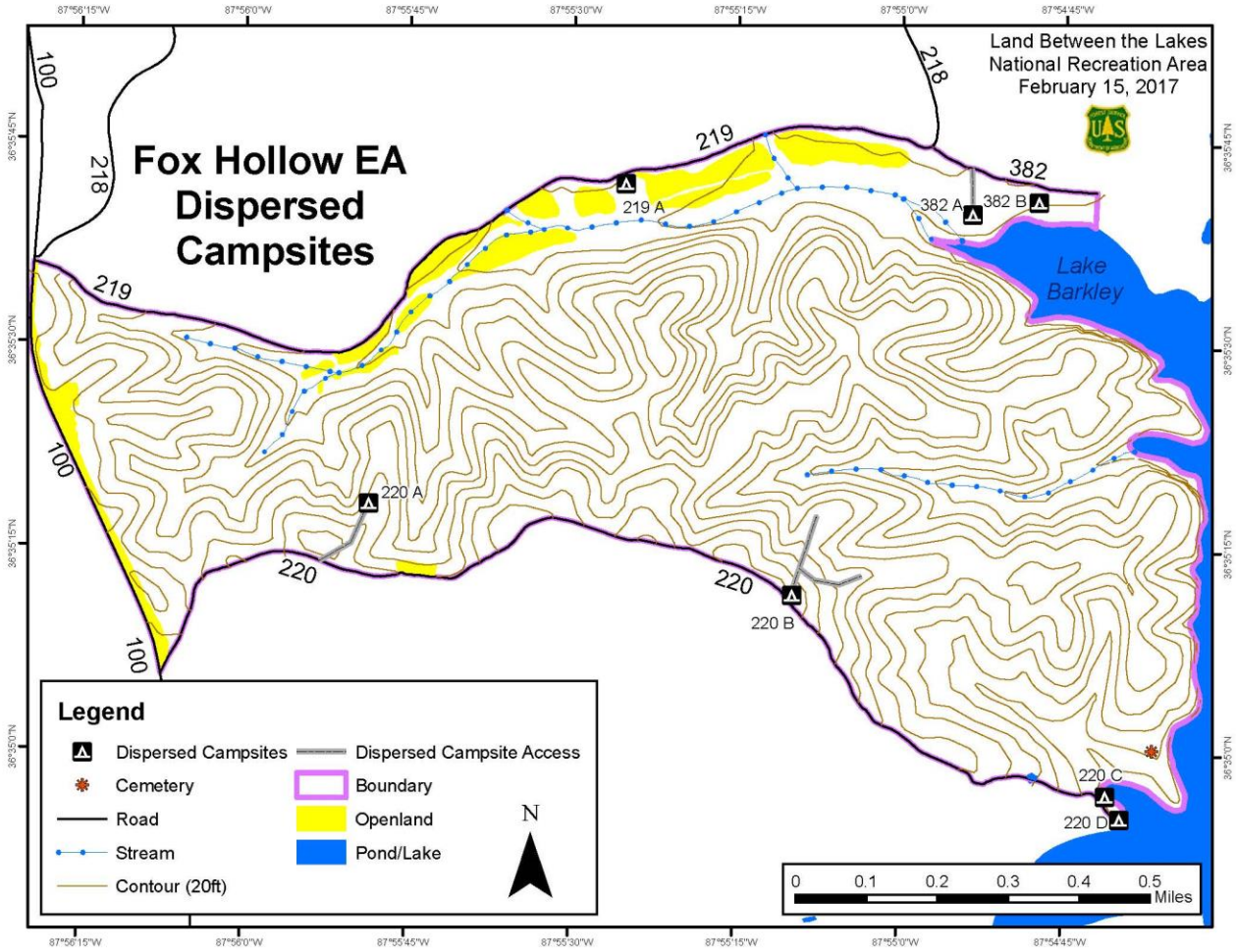

Figure 2. Fox Hollow Dispersed User-Made Sites

Roads

The Fox Hollow project area is bordered by Forest Service Roads 100 (Woodlands Trace), 219, 220, and 382 as illustrated in the map in Figure 1 above. Road 219 is 1.42 miles, Road 220 is 1.8 miles and Road 382 is 0.28 miles. Visitors access Nolin Cemetery by walking from Road 220. Roads 220 and 382 provide access to the shoreline. Fox Hollow's roads exhibit signs of rutting and damage, and road sections remain wet due to poor drainage and limited sunlight penetration.

The last 300 to 500 feet of Road 220 is eroded and scoured. The roadside ditch and road surface is rutted.

The Area Wide Transportation Report indicated Road 382 is likely not needed and should be considered in future analysis. Road 382 does not provide access to any project, cemetery, or facility. Severe rutting and wet sections of the road often makes the road unusable to all but a small number of visitors in four-wheel drive high clearance vehicles. Severe erosion occurs at the user-made dispersed site and the user-made access to the lake.

Damage caused by user-made accesses and use of the shoreline needs to be addressed.

See the *Fox Hollow Project Travel Analysis* for the details about the roads and user-made accesses in the project area. (USDA 2017)

Heritage

Heritage staff surveyed part of the area to identify 11 historic sites. No prehistoric sites were found within or adjacent to the Fox Hollow project area. Staff plan to survey and catalogue all known heritage sites within the remainder of the Fox Hollow project area. Heritage sites need to be protected from negative project impacts.

Descendants of the families who lived in the project area desire to identify and research heritage sites. The Nolin Cemetery sign is not placed in the correct location and the name on the sign is spelled incorrectly. The cemetery is in bad shape with trees down. The descendants' Cemetery Contact asked for help in cemetery restoration and research. There is no road to the cemetery and has not been since before Tennessee Valley Authority acquired the property.

Ecosystem

The project area is comprised of approximately 45 acres of pine stands, 490 acres of hardwoods, and 25 acres in managed open lands. See the locations on maps in the *Fox Hollow Team Assessment, February* 2017. The stands contain approximately 84 acres former "old fields" of previously disturbed areas where hardwoods have succeeded and where the Tennessee Valley Authority planted loblolly pine approximately 40-50 years ago. Loblolly pine is not native to Land Between the Lakes.

Pine and hardwood forest stands occur on highly erosive soils with high rutting potential. Due to the highly erosive conditions of the soils, implementation of land management activities would require severe restrictions and mitigations. We plan to work with the Southern Research Station and the Natural Resources Conservation Service to develop a long term strategy for treatments on these type soils at Land Between the Lakes.

Fox Hollow includes one active bald eagle nest. We monitor this and any other new bald eagle nest sites within the project area in accordance with the 2007 US Fish and Wildlife Service Post-delisting National Bald Eagle Management Guidelines. The minimum buffer zone required is 330 feet and would be expanded if evidence of disturbance of the nest occurred. The bald eagle is a regional forester's sensitive species. Bald eagles are protected under the Bald Eagle Act. Their populations are monitored and protected under the Migratory Bird Treaty Act.

Other than the bald eagle, no federally proposed, threatened, endangered, or sensitive species are known to occur in the project area.

Although non-native invasive species exist across the project area, there is not an imminent need to address them in Fox Hollow forest lands at this time. We currently treat non-native invasive species in the open lands in Fox Hollow, as we do in open lands across Land Between the Lakes.

Alternatives

Alternative 1 – No Action

Recreation

We would continue to allow vehicle access to the shoreline at the end of Road 220 where use causes the erosion near site 220D.

We would allow user-made accesses leading to the user-made sites 220A and 220C and beyond 220B where damage occurs to the watershed. Visitors would be able to drive to user-made sites 382A and 382B where rutting occurs. Site 382A might be used as a boat-in dispersed campsite as part of the water trails initiative.

Environmental Education

We would continue to involve the public through learning about and participating in all facets of dispersed recreation, roads management, and ecosystems at Land Between the Lakes.

Topics currently interpreted include: open lands, wildlife food plots, floodplains, oak hickory forest, loblolly pine forest, erosion and its prevention on steep slopes, roads and user-made sites and lake access. Multiple historic sites could be interpreted in the Fox Hollow project area. The rich history of the Nolin family could be explained.

Day-use environmental education facilities and Brandon Spring will continue teaching the public, school groups and other groups about a variety of topics. These topics include ecosystems, adaptations, managing for multiple species, our dependence upon nature, personal stewardship, and other aspects of natural and cultural education.

Roads

We would continue to manage roads through routine road maintenance. Annual road maintenance depends upon budget and priorities. No trees would be cut along Road 220. The ponding of water along Road 220 would continue.

We identified repairs and reconstruction on Roads 219 and 220 that need to be addressed. Although these repairs could be performed under a categorical exclusion for repairing roads, we discuss the repairs as part of the no action alternative to disclose them as more than routine road maintenance. The work would depend upon budget and priorities.

A storm event damaged a natural low water crossing on Road 219 and made it difficult to cross. The Forest Service installed a temporary culvert and gravel surface at that location. Recently the temporary culvert and gravel surface have been damaged by another storm event. The temporary culvert and gravel surface will be replaced with a natural low water crossing. Drainage would be improved.

We propose to control erosion from gullies along Road 220. Repairs could include road reshaping, road gravel surfacing, ditch re-establishment, scour repairs, installation of two rolling dips, rip rap placement in roadside ditch, and rip rap placement in down slope erosion scour. Drainage would be improved.

Road 382 would remain open even though the roadbed is on highly saturated soils. Visitors would continue to drive off Road 382 damaging the mudflats on the edge of Lake Barkley. Unauthorized driving off of Road 382 to the user-made dispersed campsites on the shoreline would continue.

Heritage

The Forest Service would continue routine heritage program management under the No Action Alternative.

The Forest Service will continue to protect or exclude heritage sites from routine road maintenance.

The Forest Service would place a new cemetery sign at the correct location of Nolin Cemetery. We would work with the descendants to clean up the cemetery, map it, and conduct research to locate unidentified graves. We would remove hazard trees within the cemetery boundary to protect cemetery remains. We would coordinate with former residents and/or descendants of former residents to interpret the rich history of the Fox Hollow area.

Ecosystem

Our contractors/partners would continue to maintain approximately 25 acres of open fields in Fox Hollow. Of this, we planted around 15 acres in wheat and clover as supplemental food for wildlife. The remaining open land fields consist of native grasses, forbs, and borders along streams also known as riparian corridors. See the Revised Maintenance of Open Lands Environmental Assessment and Decision.

We would continue to monitor the known active bald eagle nest in Fox Hollow and any new bald eagle nest sites within the project area in accordance with the 2007 US Fish and Wildlife Service Post-delisting National Bald Eagle Management Guidelines. The minimum buffer zone required is 330 feet and would be expanded if evidence of disturbance of the nest occurred. The bald eagle is a regional forester's sensitive species. Bald eagles are protected under the Bald Eagle Act. Their populations are monitored and protected under the Migratory Bird Treaty Act.

Alternative 2 - Revised Proposed Action and Alternatives

Recreation

We propose to place boulders to block vehicle access to the user-made boat launch at the end of Road 220 to address the erosion being caused from its use. The use of the shoreline to unload boats from trailers causes the erosion near site 220D. Visitors will be able to walk to the shoreline.

We propose to block the user-made accesses leading to the dispersed campsites 220A and 220C and beyond 220B to prevent further damage to the watershed. Visitors will not be able to drive to user-made sites 382A and 382B if we close Road 382 as proposed. People will be able to walk to the user-made sites after vehicle access is blocked. Site 382A might be used as a boat-in dispersed campsite as part of the water trails initiative.

See the map in Figure 2 for the locations.

Environmental Education

We propose to involve the public through learning about and participating in all facets of dispersed recreation, roads management, and ecosystems at Land Between the Lakes.

Topics to be interpreted include: open lands, wildlife food plots, floodplains, oak hickory forest, loblolly pine forest, erosion and its prevention on steep slopes, roads and user-made sites and lake access. Multiple historic sites could be interpreted in the Fox Hollow project area. The rich history of the Nolin family could be explained.

Day-use environmental education facilities and Brandon Spring will continue teaching the public, school groups and other groups about a variety of topics. These topics include ecosystems, adaptations, managing for multiple species, our dependence upon nature, personal stewardship, and other aspects of natural and cultural education.

Roads

We would continue to manage Roads 219 and 220 through road maintenance, improvements, and daylighting. Annual road maintenance and improvements depends on budget and priorities.

We propose to improve drying of Road 220 through the use of daylighting by cutting and leaving trees up to 25 feet from the centerline of the road. This would have the additional benefit of creating a softer edge effect along the roads. The trees would be cut in nonmerchantable lengths after we cut limbs and tops from the main trunks. The cut lengths will be laid on the ground in the forest. Piles of limbs and tops will be less than or equal to three feet high in forested areas. The direction and location trees are laid would need to be chosen on a case-by-case basis to ensure trees do not disturb heritage assets, road surfaces or road drainage features.

The interdisciplinary team examined eight locations on Forest Service Road 220 and six of these locations were identified for select removal of trees within 25 feet of the road centerline. See the map in Figure 3 and Table 1 for the segments of road to receive daylighting. From 1 to 12 trees could be removed at each location.

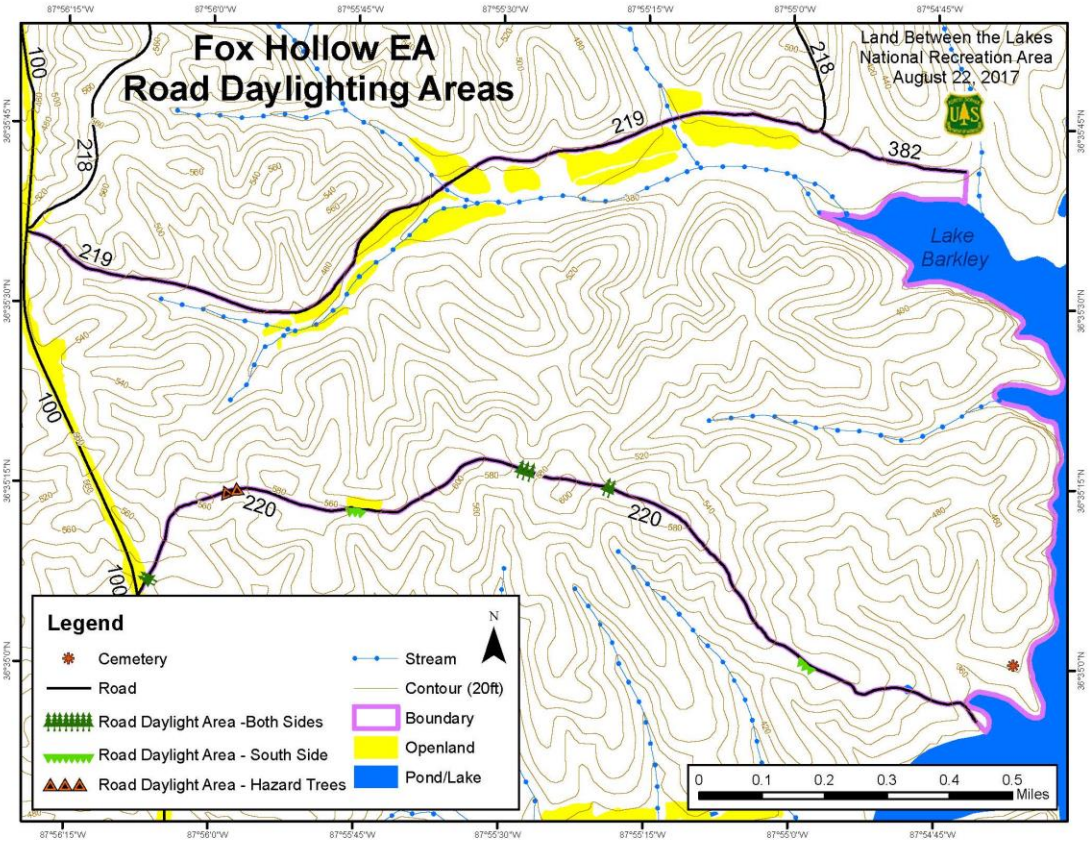

Figure 3. Road 220 Road Daylighting Areas

Table 1. Forest Service Road 220 Daylighting and Maintenance

Location Number	GPS Coordinates at the Start Point	Action
FSR 220-1	36.587326, -87.932977	Tree removal to facilitate road surface drying; and maintenance.
FSR 220-2	36.586932, -87.929299	Tree removal to facilitate road surface drying; and road maintenance.
FSR 220-3	36.587777, -87.924037	Tree removal to facilitate road surface drying; and road maintenance.
FSR 220-4	36.587439, -87.921767	Tree removal to facilitate road surface drying; and road maintenance.

FSR 220-5	36.583341, -87.915933	Tree removal to facilitate road surface drying; and road maintenance.
FSR 220-6	36.582441, -87.911483	No tree removal. Road maintenance.
FSR 220-7	36.586763, -87.934246	No tree removal. Road maintenance.
FSR 220-8	36.585225, -87.935156	Tree removal to facilitate road surface drying; and road maintenance.

As noted in the No Action Alternative, we identified repairs and reconstruction on Roads 219 and 220 that need to be addressed. Although these repairs could be performed under a categorical exclusion for repairing roads, we discuss the repairs as part of the action alternative to disclose them as more than routine road maintenance. The work would depend upon budget and priorities.

A storm event damaged a natural low water crossing on Road 219 and made it difficult to cross. The Forest Service installed a temporary culvert and gravel surface at that location. Recently the temporary culvert and gravel surface have been damaged by another storm event. The temporary culvert and gravel surface will be replaced with a natural low water crossing. Drainage would be improved.

We propose to control erosion from gullies along Road 220. Repairs could include road reshaping, road gravel surfacing, ditch re-establishment, scour repairs, installation of two rolling dips, rip rap placement in roadside ditch, and rip rap placement in down slope erosion scour. Drainage would be improved.

The Forest Service proposes to close and obliterate Road 382 because the roadbed is on highly saturated soils. We propose to permanently block access to the closed road, thus preventing vehicle access to user-made dispersed campsites on the shoreline where severe rutting occurs. Boulders would be placed to block access to closed Forest Service Road 382.

Heritage

Areas of proposed road closure, maintenance and daylighting were surveyed. Exclusion zones would be identified prior to any road work. Heritage sites would be avoided when exposing Road 220 to more sunlight during proposed tree cutting and laying trees on the ground. Heritage sites will be protected and excluded from negative project impacts.

The Forest Service proposes to place a new cemetery sign at the correct location of Nolin Cemetery. We would work with the descendants to clean up the cemetery, map it, and conduct research to locate unidentified graves. We propose to remove hazard trees within the cemetery boundary to protect cemetery remains. We would coordinate with former residents and/or descendants of former residents to interpret the rich history of the Fox Hollow area.

Ecosystem

Our contractors/partners would continue to maintain approximately 25 acres of open fields in Fox Hollow. Of this, we planted around 15 acres in wheat and clover as supplemental food for wildlife. The remaining open land fields consist of native grasses, forbs, and borders along streams also known as riparian corridors. See the Revised Maintenance of Open Lands Environmental Assessment and Decision.

We would continue to monitor the known active bald eagle nest in Fox Hollow and any new bald eagle nest sites within the project area in accordance with the 2007 US Fish and Wildlife Service Post-delisting National Bald Eagle Management Guidelines. The minimum buffer zone required is 330 feet and would be expanded if evidence of disturbance of the nest occurred. The bald eagle is a regional forester's sensitive species. Bald eagles are protected under the Bald Eagle Act. Their populations are monitored and protected under the Migratory Bird Treaty Act.

Design Criteria

- Any road work, as described in the addendum to the Biological Assessment, and that is proposed to occur in disturbed areas that receive continual visitor use, will only occur during daylight hours when bats are not actively foraging. Further, stream corridors and lake shorelines that could be used for foraging will be protected through implementation of Area Plan standards and best management practices. If any potential roost trees need to be removed, provided they do not pose an immediate hazard or health risk, they will be left standing until outside the Indiana bat and Northern long-eared bat summer roosting season (April 1 to September 15), and/or outside the fall swarming season (September 16 to November 15) within 5 miles of Tobaccoport Cave to avoid direct impacts to the Indiana bat and Northern long-eared bat, or until after an emergence count has determined that no bats are roosting in the tree(s). The Kentucky Field Office will be contacted if roosting bats are found.

- Cutting trees for road daylighting will be performed by hand with chainsaws. Any heavy equipment used will remain on the road surface and not on the soft shoulder. After the trees are cut, branches will be cut from the trunks and scattered and the trunks will be cut into nonmerchantable lengths. The cut trees will be spread on the ground with no limbs or debris above three feet of the ground surface.

- Roads 219 and 220 existed in the historic period and many of the documented heritages sites are located along these roads in the Fox Hollow project area. Documented heritage sites along Roads 219 and 220 contain historic trees that should not be removed. Maps with exclusion zones are on file with the Heritage Program Manager. Exclusion zones identified during the heritage surveys must be avoided during any daylighting activities. The six daylighting areas illustrated in the map in Figure 3 do not contain any trees within known heritage sites.

- Road maintenance, construction and reconstruction activities require coordination with heritage resource staff.

Comparison of Alternatives

Table 2 provides a direct comparison of Alternatives 1 and 2 for each resource area.

Table 2. Comparison of Alternatives

	Alternative 1 – No Action	Alternative 2 – Modified Proposed Action
Recreation	• Allow visitors to access to user-made sites with vehicles • Allow boat launching along the shoreline at end of Road 220	• Block vehicle access to user-made sites as described under roads section • Block user-made boat launching on shoreline at end of Road 220
Environmental Education	• Provide environmental education about the project area	• Provide environmental education about the project area
Roads	• Continue to maintain Roads 219, 220, and 382	• Close Road 382 • Continue to maintain Roads 219 and 220 • Block vehicle access to user-made sites 220A and 220C and beyond 220B • Cut and leave trees along edges of Road 220 to provide limited daylighting
Heritage	• Maintain walk-in access and reduce hazards to Nolin Cemetery • Identify boundary of Nolin Cemetery	• Maintain walk-in access and reduce hazards to Nolin Cemetery • Identify boundary of Nolin Cemetery
Ecosystem	• Monitor and protect eagle nest site as required by law • Continue to manage wildlife plantings under the Open Lands Environmental Assessment	• Monitor and protect eagle nest site as required by law • Continue to manage wildlife plantings under the Open Lands Environmental Assessment

Alternatives Considered and Dropped from Further Study

Recreation

The August 2016 proposal included hardening the user-made ramp or stabilizing the bank to reduce localized erosion on Barkley Lake shoreline at the end of Road 220. Due to the lake levels changing and flooding, a sustainable boat ramp would be expensive. The Corps of Engineers would need to be a cooperating agency on the environmental assessment. Hardened boat ramps are located nearby at Neville Bay and Gatlin Point.

We proposed to adopt user-made accesses and campsites to the Forest Service system and explain why this changed in the first paragraph under roads below.

In August 2016 we proposed to add trail opportunities. We currently operate with no net gain of trail miles. We do not know what trails to eliminate for creation of trails in Fox Hollow since we

are limited by how many miles we maintain. Existing trails located at Land Between the Lakes provide similar experiences to what would be found in Fox Hollow.

Roads

In the fall of 2016 we requested input about adding accesses to user-made dispersed campsites in Fox Hollow to the Motor Vehicle Use Map. The user-made accesses to dispersed sites 382A, 220A, and 220C and beyond 220B would need improvements to be considered official Forest Service roads. Work to maintain the roads would be regular since the accesses are in moist or erosive areas. We do not recommend adding these accesses given the challenges of keeping the existing roads maintained. The shoreline access off Road 382 would be blocked when Road 382 is closed.

We do not recommend access to Nolin Cemetery other than the current walk-in access. The cemetery contact indicated they do not need vehicle access to the cemetery.

We do not recommend adding additional road access to Nolin Cemetery because there was no road access to the cemetery before the construction of Lake Barkley. The current walk-in access from Road 220 to the cemetery is adequate. Neither the cemetery contact nor the Forest Service need vehicle access to the cemetery.

Ecosystem

Last year we proposed to create less than 18 acres of early successional habitat. Further evaluation showed the soils in the project area are poor and would require extensive mitigations to convert the forested area to early successional habitat. The soils in the project area have high rutting potential and are acidic. Removal of trees would likely create gully erosion. The poor soils and steep slopes in Fox Hollow led to dropping the proposal to convert the loblolly pine stands to native vegetation until we develop a strategy with the Southern Research Station and the Natural Resources Conservation Service for implementation of land management activities on these soils.

The August 2016 proposal included reclamation of 7 existing ponds. After field evaluation, we do not recommend we disturb the water holes in the project area. The banks of all but one of the ponds are stable and holding water. We observed sunfish floating at the surface in one waterhole and amphibian egg masses in at least half of the waterholes. The existing waterholes appear viable.

We proposed to restore canebrake in Fox Hollow. Adequate sunlight is needed for canebrake restoration. This would require up to 10 acres tree removal around existing cane populations of about 0.3 acres to restore enough canebrake to benefit wildlife and manage efficiently. The nearest cane is about 500 feet from a series of wildlife openings maintained in clover. We do not recommend changing the management of the opening, therefore existing canebrake would not be expanded in Fox Hollow.

The location and poor soils of “old fields” or previously disturbed areas would not lead to feasible reclamation.

Although non-natives exist across the project area, there is not an imminent need to address them at this time. We currently treat non-native invasive species in the open lands in Fox Hollow, as we do in open lands across Land Between the Lakes. No imported fire ants or feral hogs were observed within the project area. Imported fire ants and feral hogs would be treated as part of the overall Land Between the Lakes strategy.

Creation of wood duck habitat would need to occur along the lake and in coordination with the Corps of Engineers and the Tennessee Wildlife Resources Agency. Wood ducks are being managed along the lake in Kentucky by the Kentucky Fish and Wildlife. The state of Tennessee does not have a wood duck program along Land Between the Lakes shores. The Forest Service wildlife staff do not recommend the resources be spent on a wood duck effort on the Land Between the Lakes' shores in Tennessee.

An opportunity we proposed for comment was to establish green tree reservoirs. Green tree reservoirs could be harmed by flooding and would require extensive management in riparian areas with poor soils.

We proposed in August 2016 to incorporate prescribed fire into our habitat development strategy for Fox Hollow in designated areas on a rotating and reoccurring basis, as part of habitat development and maintenance. Potential erosion of the soils and steep slopes limit the use of fire across the landscape to open the canopy sufficiently to support early successional habitat. Burning small sections of the project area would introduce negative impacts from creation of control lines on the poor soils and steep slopes.

We dropped the creation of a buffer around the eagle nest as a proposal because we are required to monitor bald eagle nesting by the 2007 US Fish and Wildlife Service Post-delisting National Bald Eagle Management Guidelines. The minimum buffer zone required is 330 feet and would be expanded if evidence of disturbance of the nest occurred.

Environmental Impacts of the Proposed Action and Alternatives

This section summarizes the potential impacts of the No Action and Modified Proposed Action Alternatives.

Soils and Water

Existing Conditions

The project area lies in the Bards Lake/Cumberland River Watershed (Hydrologic Unit Code #051302050407). This watershed is located in the south eastern most area of the Land Between the Lakes and on private lands east of Lake Barkley. The total acreage of the Bards Lake/Cumberland River Watershed is 44,365 acres. The portion of the watershed that is located in Land Between the Lakes is 21,790 acres, or approximately half of the entire watershed. The Fox Hollow project area makes up less than 2 % of the entire watershed and less than 3 % of the Land Between the Lakes portion of the watershed. See the map in Figure 4.

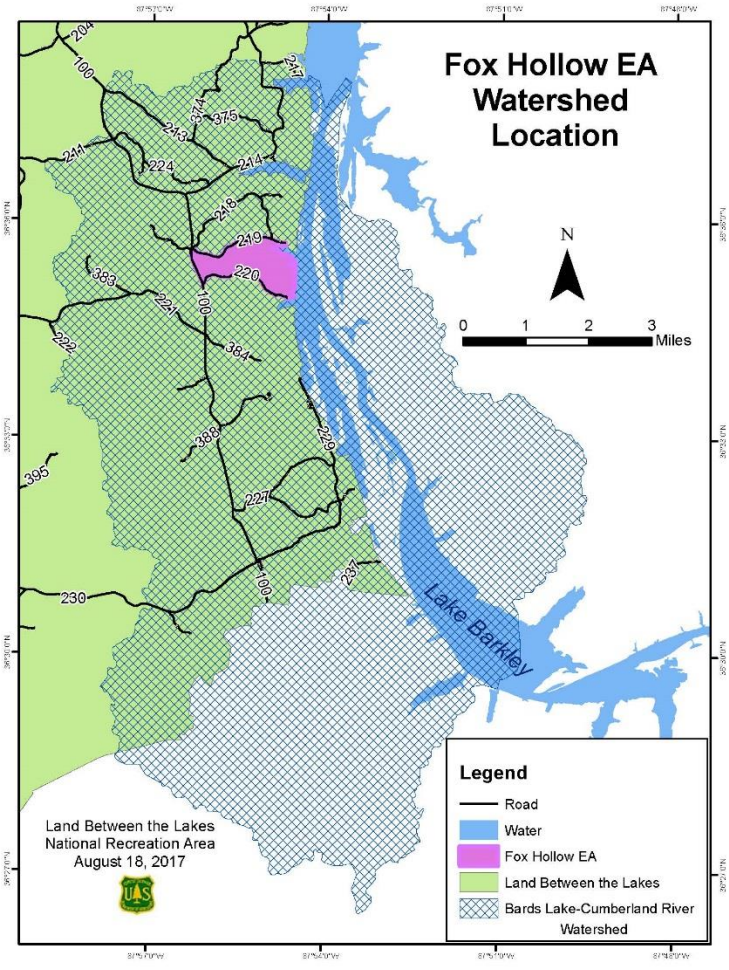

Figure 4. Bards Lake-Cumberland River Watershed

The USDA Natural Resources Conservation Service (NRCS) Web Soil Survey describes the soils in the project area to be susceptible to severe erosion, rutting, and compaction. (The soil Land Capability Classes are mostly 3e and 7s, or soils with severe limitations.) https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

Forest Service Road 382 is 0.28 mile long and dead ends at a very wet prone area. Forest Service Road 382 is only accessible by four-wheel drive high clearance vehicles. The road tread is incised in many areas and eroding. As areas become too rutted or wet, vehicles on the edges of the road create more erosion and sedimentation by displacing soil and other materials. See Figure 5.

Figure 5. Road 382

There are also two areas ponding sizeable amounts of water. The larger area measures approximately 15 feet by 40 feet, and over two feet at its deepest point. There is also a seasonal low water flow crossing that is wet most of the year. Traffic through this seasonal low water flow crossing negatively affects aquatic organisms.

Road 382 dead ends in a riparian area (Figure 6) and stays wet most of the year. The dead end contains deep ruts and allows vehicles access to the mudflats on the shoreline. Visitors drive off Road 382 and disrupt the functioning of the mudflats during winter pool stage of Lake Barkley. This also causes soil erosion and sediment runoff into the bay, decreasing water quality.

Figure 6. Road 382 Dead End

Forest Service Road 220 has areas that are heavily shaded causing slow drying of the road following rain events. Forest Service Road 220 has 6 areas (see map in Figure 3 and GPS coordinates in Table 1) that stay wet or have puddles for a longer period of time than other sections of the road. These "wet/puddled areas" are being abused by vehicles as places to use in a similar manner as an Off Road area to create mudding areas. As the areas increase in size, water collects and remains in the puddles for a longer period of time. Visitors are using these areas to drive their vehicles through creating larger puddles, causing the soil and other materials to dislodge. When the vehicles drive through these areas at a high rate of speed, soil and other materials are being splashed out of the wet areas and are running downslope to drainages which lead to larger streams and eventually to the Cumberland River leading to contributing to poor water quality. Another result is widening of the roads in the areas of the misuse. These abused areas also have the potential to become a safety issue.

Forest Service Roads 219 also has a location in need of repair or reconstruction. A temporary culvert and gravel surface needs to be removed and this crossing returned to a low water stream crossing. See Figure 7 below.

Figure 7. Temporary Culvert on Road 219

Forest Service Road 220 has gully erosion occurring in the road ditch near the end of the road. Multiple causes of the gully erosion include the steep slope, lack of adequate road design and construction, and lack of maintenance. Debris build up forces water out of the ditch. The water then cuts a gully across Road 220, forming a head cut on the north side of the road. See the photograph in Figure 8 below.

Figure 8. Gully Erosion on Road 220

Users launch boats from the unimproved shoreline at the end of Road 220 contributing sediments directly into Lake Barkley. See the photograph in Figure 9 below.

Figure 9. Lake Barkley shoreline damage at end of Road 220

Alternative 1 - No Action Alternative

Direct and Indirect Effects

With the No Action Alternative “Daylighting” of road 220 will not occur. This will allow the road to remain heavily shaded in certain areas allowing the road to remain wet and mud/water puddles to remain for longer durations of time. See the photographs in Figure 10 below.

Figure 10. Spring fed puddle enlarged by use.

Wet/puddled areas may enlarge in size and contribute to more sediment and debris migrating to drains, degrading water quality.

Regular road maintenance would continue to occur. Maintenance prevents impassable conditions caused by road ditch gullies leaving their banks and cutting across road surfaces. This prevents uncontrolled sediment movement. Repairs to Roads 219 and 220 would improve drainage and minimize soil migration.

Shoreline use to launch boats at the end of Road 220 will continue and may expand, causing more erosion and sediment movement into Lake Barkley.

Cumulative Effects

Other than occasional road maintenance, mostly consisting of light road grading, no other projects recently occurred in or near this area. No future projects near this area are planned. Therefore there are no cumulative effects from no action.

Alternative 2 – Modified Proposed Action

Direct and Indirect Effects

Land Between the Lakes is proposing to close Forest Service Road 382 to vehicle use. This will eliminate rutting from user made accesses to dispersed camping sites. Visitors will still be able to access these user-made dispersed camping sites, however, they will become walk in sites. This will allow vegetation to begin to reestablish along on the road prism reducing erosion. Closure of Road 382 will also eliminate degradation of the shore line/riparian areas by restricting vehicles from the riparian/shore line areas.

Road 220 has areas that retain moisture and water puddles. A common technique to increase the drying effect of the sun and wind is “daylighting” or clearing trees near the road to allow more light and wind to reach the road surface. Daylighting will be utilized in specific areas, up to 25 feet from the center line of the road to help dry roads at a faster rate. Most of Road 220 runs east, west.

Soil disturbance during cutting and leaving trees along six areas of Road 220 will be minimal. Daylighting will be performed by hand with chainsaws, any heavy equipment used will remain on the road surface and not on the soft shoulder. After the trees are cut, branches will be cut from the trunks and scattered and the trunks will be cut into nonmerchantable lengths. The cut trees will be spread on the ground with no limbs or debris above three feet of the ground surface. With more sunlight reaching the ground, an herbaceous ground cover should develop which would help to control any soil disturbance caused by the tree felling.

The removal of trees for daylighting may contribute to an increase in water yield reaching the road. However, no adverse effects are anticipated with proper road maintenance, properly spaced drainage, and increased roadbed drying.

Forest Service Roads 219 and 220 will receive regular road maintenance to fill puddle/pothole areas. Cut out drains will be maintained to divert water before it reaches low lying areas. Gullied road ditches will be repaired. Best Management Practices such as, but not limited to, rolling dips, geotextile lining and rip rap armoring, among other techniques, will be installed where needed. Road maintenance and Best Management Practices will be performed in accordance with Forest Service specifications (USDA 1996) and the Land and Resource Management Plan design criteria (USDA 2004). These repairs would minimize soil migration.

The user made boat launch access at the end of Road 220 will be blocked to prevent unauthorized use. This will eliminate rutting and degradation of the lake shore, preventing sediment delivery to the lake and improving water quality. Paddlers would continue to access the shoreline from Lake Barkley.

Cumulative Effects

Other than occasional road maintenance, mostly consisting of light road grading, no other projects recently occurred in or near this area. No future projects near this area are planned. Therefore there are no cumulative effects to soil and water from the modified proposed action.

Recreation

The detailed description written for the Fox Hollow Team Assessment in February, 2016 contains the existing condition of each of the user-made campsites and shoreline damage. The description is updated in this section of the environmental assessment. Dispersed camping, hunting, fishing, and driving for wildlife viewing occurs in the project area. See the map of the location of the user-made dispersed sites in Figure 2 above.

There is evidence of dispersed camping for hunting and water recreation in the Fox Hollow Project Area. There are seven documented user-made dispersed campsites. Photograph documentation of the sites follows the description of each site.

Dispersed Site 219 A – This user-made dispersed camp site shown in Figure 11 is located on the south side of Road 219 near the access to Lone Pine Cemetery. This site is a frequently used dispersed campsite. Access to this site is within 75 feet of Road 219. As with most user-made dispersed sites there is some litter and damage to the trees in the site with nails and hack marks. The site is covered in vegetation with no visible erosion. This campsite is located close to an old home place; however, camper's activities do not appear to be impacting the integrity of the heritage site.

Figure 11. Dispersed Campsite 219 A, N 36 35 6.95 W 87 55 41.7

Dispersed Site 382 A. – This site shown in Figure 12 is located south of Road 382 about .08 mile east from the Road 382 and 219 intersection. The site is approximately 275 feet south off Road 382. The user-made access to 382 A is a native surface, free of rutting with no erosion, but subject to flooding. The site is a lightly used site that does not appear to be a campsite but a warming fire for fishing. There is litter in the area but it seems to be mostly debris from the lake. Figure 13 shows evidence that some people use the road to access and drive through the mud flats along the shore when Lake Barkley is at winter pool stage.

Figure 12. Dispersed Campsite 382 A and User-made Access, N 36 35 666 W 87 54 888

Figure 13. Flood Plain damage near Site 382 A

Dispersed Site 382 B. – This user-made dispersed camp site shown in Figure 14 is located on the south side of Road 382 about 0.15 mile east of the intersection of Roads 382 and 219. User-made access to this site is within 75 feet of Road 382. There is some litter and damage to the trees in the site with nails and hack marks. The site is covered with native surfacing and slightly sloped. There is no evidence of any significant erosion. Road 382 is only passable by four wheel drive vehicle in the vicinity of this site. The site is a moderately used site.

Figure 14. Dispersed Campsite 382 B, N 36 35 686 W 87 54 771

Dispersed Site 220 A - This user-made dispersed camp site shown in Figure 15 is located on the north side of Road 220 at the end of an 800 foot long native surface user-made access into the woods. It is a large opening in the forest canopy. The site is clear of any vegetation, but does not show evidence of significant recreation use, with the only evidence being scattered, expended shotgun shells. This site may be a parking lot for hunters more than a campsite. This site appears to be on or near an old home place site. Camping does not impact the intact elements of the heritage site. The user-made access has some rutting along the last 200 feet.

Figure 15. Dispersed Campsite 220 A, N 36 35 156 W 55 113

Dispersed Site 220 B - This user-made dispersed camp site shown in Figure 16 is located on the north side of Road 220. User-made access to the site is within 75 feet of Road 220. This site is a low to moderate use site that is covered in vegetation and does not show any evidence of erosion. This dispersed site historically has been a hunter campsite during deer and turkey season. The user-made access is down a steep slope beyond site 220B where erosion is occurring.

Figure 16. Dispersed Campsite 220 B, N 36 35 156 W 55 113

Dispersed Site 220 C – This user-made dispersed camp site shown in Figure 17 is located north of Road 220 just before the end of Road 220. This is a site that was used in the past and is more than 75 feet off Road 220. However the user-made access is highly eroded by water flowing off Road 220. The site itself has been flooded by several past flood events and does not appear used in several years.

Figure 17. Dispersed Campsite 220 C, N 36 34 979 W 87 54 698

Dispersed Site 220 D – This user-made dispersed camp site shown in Figures 18 and 19 is a heavily used large site located at the end of Road 220. This site is occupied most of the time from April through October. There are impacts to the site from litter and damage to existing trees. The site is covered with native gravel material and some vegetation. The site is not expanding. There is not significant erosion on the site from camping activities. Figure 20 shows there is rutting in the site at the end of Road 220 as some have used it to access the lake to unload boats, possibly for the Army Corps of Engineer lease duck blind visible from Road 220. This rutting could result in a long term erosion problem.

Figure 18. Dispersed Campsite 220 D, N 36 34 931 W 87 54 676

Figure 19. Dispersed Campsite 220 D

Figure 20. Erosion from boat launching near Dispersed Campsite 220 D

Alternative 1 – No Action

The current recreational uses in the Fox Hollow Project Area will continue. The majority of the activity will include hunting, fishing, dispersed camping, and driving for wildlife viewing. There will also continue to be light equestrian use for small game hunting.

The user-made campsites will continue to have resource impacts related to litter, minor erosion, soil compaction, and degradation and possible death of the trees located in the user-made campsites. The campsite located at the end of Road 220 (Dispersed Campsite 220 D) currently has some rutting from users launching boats at the end of the road. If this use continues, this could get worse, especially given that the area floods frequently. There will be significant erosion increase on the user-made boat launch if the drainage issue just east of the end of Road 220 is not addressed. Water will continue to flow through the site from the road and cause increased erosion beyond that created by launching boats. The boat launching may then move to another section of the shoreline, thus creating an additional impact area.

Two campsites, user-made dispersed sites 220A and 382A, have user-made accesses of 800 feet and 275 feet respectively. If vehicle traffic continues on this access especially by large four wheel drive vehicles in wet weather, the current rutting could become worse and erosion could become

greater given the highly erodible classification of the soils or riparian area these user-made accesses are located on. The user-made launch would soon become unusable.

Vehicle access to user-made site 220C would continue. Damage from water flowing off road 220 along the user-made access would continue until the drainage along that section of Road 220 is repaired. Repairs would occur when budgets allow. Camping is not expected to increase once the drainage is fixed because the site is not heavily used.

There would be no cumulative effects to dispersed recreation from the no action alternative because there are no other recent or anticipated projects near Fox Hollow.

Alternative 2 – Modified Proposed Action

Direct, Indirect and Cumulative Effects

Road 382 would be closed in this alternative so the user-made campsite 382A would be reachable by walking to it. Some boaters and paddlers may walk to the campsite from the shore of Lake Barkley. The 275 foot user-made access from Road 382 would naturally regrow vegetation because no driving would occur on the access. Walking would cause minimal disturbance to the vegetation.

The 800 foot user-made access to user-made campsite 220A would be barricaded with boulders and vegetation allowed to regrow where vehicles previously disturbed it. Campers would access the site by walking from Road 220.

User-made site 220B would remain accessible by vehicles because the site is covered in vegetation and does not show signs of erosion. The user-made access down a steep slope beyond the campsite would be blocked with boulders to reduce erosion being caused by vehicles. Vegetation would be allowed to regrow.

Vehicle access to user-made site 220C would be blocked using boulders. Visitors would reach the site by walking to it. Damage from water flowing off road 220 would continue until the drainage along that section of Road 220 is repaired. Camping is not expected to increase because the site is not heavily used.

These small changes in vehicle access to user-made campsites would not have a long term effect on dispersed recreation at Land Between the Lakes because there are still hundreds of opportunities for visitors to access campsites in the basic campgrounds.

Users will not be able to use the shoreline at the end of Road 220 to unload boats from trailers because the placement of boulders will block vehicle access. The use of the shoreline to unload boats from trailers causes the erosion near site 220D. Visitors will be able to walk to the shoreline for recreation.

There would be no cumulative effects to dispersed recreation from the proposed action alternative because there are no other recent or anticipated projects near Fox Hollow.

Scenery Management

There are two important scenic resources in the Fox Hollow Project Area. The first is the Woodlands Trace Scenic Byway which makes up the western boundary. The vegetation along the Trace is made up of patches of contiguous pine or hardwood broken up by the Cumberland

Electric Easement that borders the Trace. The land forms slope downward as they go east from the Trace making the foreground the most important scenic area along the Trace.

The second important scenic resource is the view of Fox Hollow from Lake Barkley. The majority of the land forms go upslope as you look to the west. This makes the foreground and middle ground the most important scenic areas from Lake Barkley.

Road 219 is mostly a bottom slope road that runs east west along Fox Hollow Creek. The view along the road is broken up by frequent fields and other openings to provide opportunity to see a variety of vegetative types and wildlife species until the road intersects Roads 218 and 382.

Road 382 is a short road that borders Lake Barkley to the north. This road is within a riparian area and the road is designed for high clearance vehicles.

Road 220 is mostly a ridge top road that travels east until it drops to Lake Barkley. The view from Road 220 is wooded in either pine or hardwood. Except for one small wildlife opening, there is little visual diversity along the road.

Alternative 1 - No Action

Direct, Indirect and Cumulative Effects

The scenery would remain about the same along Roads 219, 220 and 382. The view would be broken up by field openings on Roads 219 and 220. Most of the view from the roads are wooded in oak, hickory, maple, or pine trees. The forest has thick groundcover and the trees are growing close together so viewing of wildlife such as deer, turkey, and songbirds is difficult except in the field openings.

There would be no cumulative effects to scenery from the no action alternative because there are no other recent or anticipated projects near Fox Hollow.

Alternative 2 – Modified Proposed Action

Direct, Indirect and Cumulative Effects

Daylighting refers to a maintenance activity that removes trees to allow sunlight to reach sections of a road that have problems with wet conditions. Roads 219 and 220 were inventoried for locations where daylighting could help improve the condition of the road and reduce maintenance costs. Six locations on Road 220 were identified as benefiting from daylighting maintenance activities. Twelve or less trees would be cut down and left at each site. The trees would be cut in nonmerchantable lengths and the limbs and tops cut down to within three feet of the ground.

The impacts to the scenery resource from the proposed daylighting activities would be in the foreground of Road 220. Most of the proposed daylighting locations have a short term impact when the trees are first cut down and the leaves turn brown. After the first year, the impact to the scenery resource would be minimal. None of these locations are focal points or areas where anyone would congregate in significant numbers. Most of the traffic would just pass by these sites while driving the road for a variety of reasons including wildlife viewing, hunting, or other recreation activities.

The two larger sites would have a greater impact to the scenery resource than the other four sites. These impacts would be very noticeable in the short time but over time would be reduced as the area grew up.

Given the location of Road 220 on Land Between the Lakes, the impact to the setting of these six sites receiving treatment would be insignificant to overall scenery along Road 220 and in Land Between the Lakes National Recreation Area.

There would be no cumulative effects to scenery from the proposed action because there are no other recent or anticipated projects near Fox Hollow.

Environmental Education

Alternative 1 – No Action and Alternative 2 – Modified Proposed Action

Direct, Indirect and Cumulative Effects

Environmental education would continue at Land Between the Lakes at the day-use facilities and Brandon Spring Group Center. We would teach the public, school groups and other groups about ecosystems, adaptations, managing for multiple species, our dependence upon nature, personal stewardship, and other aspects of natural and cultural education. Education opportunities specific to Fox Hollow could address damage caused by user-made accesses to the lakes and dispersed sites. Responsible recreation could be reinforced, especially after road maintenance is complete.

Socioeconomic Resources

Alternative 1 – No Action

Direct, Indirect, and Cumulative Effects

Economic effects to the local and regional areas would result from road maintenance and dispersed recreation in the project area. Since no changes would occur in the dispersed recreation there would be no effects to regional tourism. With no action other than road maintenance, no measureable effect to ecosystem services such as clean air and water is expected. Educational, social and cultural values would remain the same.

Examples of current typical contractor completed road maintenance activities and associated costs include: road grading at $385 per mile, roadside mowing at $150 per mile, heavy equipment at $134 per hour, large dump truck at $113 per hour, roadside brush cutting at $93 per hour, and road aggregate at $14 per ton.

Table 43 shows the average annual costs to perform routine maintenance of roads in the Fox Hollow project area for Alternative 1. The total amount accounts to less than 1% of the roads budget at Land Between the Lakes in Fiscal Year 2016. Routine maintenance excludes unanticipated reconstruction, repairs or unusual down tree removal.

Table 3. Average Annual Costs to Perform Routine Maintenance for Alternative 1

	Past Average Annual Cost	Alternative 1 Future Average Annual Cost
Road 219	$ 675	$ 700
Road 220	$ 1,700	$ 1,763
Road 382	$ 142	$ 142
Total	$ 2,517	$ 2,605

The low water crossing on Forest Service Road 219 needs reconstructed at a cost of $4,200. Once reconstructed, there should be no annual maintenance needs.

There would be no cumulative effects to socioeconomics from no action because there are no other recent or anticipated projects near Fox Hollow.

Alternative 2 – Modified Proposed Action

Direct, Indirect, and Cumulative Effects

No revenue would be generated by the Fox Hollow modified proposed action. Economic effects to the local and regional areas would result from road maintenance and dispersed recreation in the project area. The small changes in the dispersed recreation would not affect tourism in the region. Since Fox Hollow is less than 1% of Land Between the Lakes as a whole, no measureable effect to ecosystem services such as clean air and water is expected. Educational, spiritual and cultural values would remain about the same.

Plans and priorities for road maintenance or road reconstruction change each year in response to unforeseen needs, problems and emergencies. Generally, available funding is used for priority road grading and mowing, winter storm and ice clearing, wind or rain storm cleanup, priority sign maintenance, removal of down trees and limbs; one or two small reconstruction projects, materials; and sometimes a small construction project.

Examples of current typical contractor completed road maintenance activities and associated costs include: road grading at $385 per mile, roadside mowing at $150 per mile, heavy equipment at $134 per hour, large dump truck at $113 per hour, roadside brush cutting at $93 per hour, and road aggregate at $14 per ton.

Table 4 shows the average annual costs to perform routine maintenance of roads in the Fox Hollow project area for Alternative 2. The total amount accounts to less than 1% of the roads budget at Land Between the Lakes in Fiscal Year 2016. Routine maintenance excludes unanticipated reconstruction, repairs or unusual down tree removal.

Table 4. Average Annual Costs to Perform Routine Maintenance for Alternative 2

	Past Average Annual Cost	Alternative 2 Future Average Annual Cost
Road 219	$ 675	$ 700
Road 220	$ 1,700	$ 1,763
Road 382	$ 142	--
Total	$ 2,517	$ 2,463

The costs of closing Road 382, improving Roads 219 and 220, daylighting six areas on Road 220 and blocking user-made accesses total approximately $29,700. This total to complete proposed road work within the Fox Hollow project area includes:

- Reconstruct the last 300 to 500 feet of Forest Service Road 220 to eliminate erosion, eliminate sedimentation and restore the road surface = $16,200. Preliminary plans to reconstruct portions of the last 300 to 500 feet of Road 220 include roadside ditch reshaping, road repair, road surface reshaping, rolling dip construction, gravel placement and rip rap erosion control placement.
- Complete routine maintenance of Forest Service Roads 219 and 220 in order to improve road surface conditions at water puddle and rutting locations = $2,400.
- Add boulders to block access to closed Forest Service Road 382 at its beginning point = $1,000. Note: permanently blocking access may require more than a gate because the gate would be in a very remote location and subject to vandalism.
- Reconstruct the natural low water crossing on Forest Service Road 219 = $4,200.
- Cut and leave select trees along Forest Service Road 220 to provide daylighting (tree canopy opening to facilitate road surface drying) = $3,100.
- Add boulders to block access to site 220A, beyond site 220B, site 220C and the shoreline at the end of Road 220 = $2,800. (assumption $700 per site)

There would be no cumulative effects to socioeconomics from the proposed action because there are no other recent or anticipated projects near Fox Hollow.

Proposed Threatened and Endangered Species

Alternative 1 – No Action and Alternative 2 – Modified Proposed Action

Direct, Indirect, and Cumulative Effects

The road maintenance, road closure, and road daylighting of the no action and modified proposed action alternatives fall within the actions described in the Biological Opinion dated January of 2010 (FWS 2009-B-0084) and the Biological Assessment Addendum of 2015. The no action and modified proposed action activities may affect, but are not likely to adversely affect the interior

least tern, gray bat, Indiana bat, Northern long-eared bat, and Prices potato bean. (Andrews 2010 and 2015)

The effects to bats are based on this design criteria.

> Any road work, as described in the addendum to the Biological Assessment, and that is proposed to occur in disturbed areas that receive continual visitor use, will only occur during daylight hours when bats are not actively foraging. Further, stream corridors and lake shorelines that could be used for foraging will be protected through implementation of Area Plan standards and best management practices. If any potential roost trees need to be removed, provided they do not pose an immediate hazard or health risk, they will be left standing until outside the Indiana bat and Northern long-eared bat summer roosting season (April 1 to September 15), and/or outside the fall swarming season (September 16 to November 15) within 5 miles of Tobaccoport Cave to avoid direct impacts to the Indiana bat and Northern long-eared bat, or until after an emergence count has determined that no bats are roosting in the tree(s). The Kentucky Field Office will be contacted if roosting bats are found.

Regional Forester's Sensitive Species

Alternative 1 – No Action and Alternative 2 – Modified Proposed Action

Direct, Indirect, and Cumulative Effects

No regional forester's sensitive plant species were identified along Roads 219 and 220 in the project area during the botany survey in March 2017.

We assessed the effects of the proposed actions on the Regional Forester's approved list of sensitive species that may occur within the project area, dated December 2004. The detailed assessment is documented in the Fox Hollow Biological Evaluation dated June 2017 and summarized in Table 5.

Table 5. Determination of Effects for Regional Forester's Sensitive Species

Determination of effects for Regional Forester's Sensitive Species.		
Species	**No Action Alternative 1**	**Modified Proposed Action Alternative 2**
Bald eagle	No impact	No direct impacts and no measurable beneficial indirect impacts. We predict that nesting and eaglet fledging success to continue with no trend to federal listing or loss of viability for this species.
Rafinesque's big-eared bat	No impact	No direct impacts and may impact individuals indirectly but not likely to cause a trend to federal listing or a loss of viability for this species.
Southeastern myotis	No impact	No direct impacts and may impact individuals indirectly but not likely to cause a trend to federal listing or a loss of viability for this species.
Butternut	No impact	No direct, indirect, or cumulative impacts.
Fraser's yellow loosestrife	No Effects	Not evaluated, not present and no potential habitat in project area.
Barbed rattlesnake-root	No impact	No direct impact and no measurable beneficial indirect or cumulative impacts.
Appalachian bugbane	No Effects	Not evaluated, not present and no potential habitat in project area.
False Indian plantain	No impact	No direct, indirect, or cumulative impacts.
Ocean blue phacelia	No Effects	Not evaluated, not present and no potential habitat in project area.
Spreading yellow false foxglove	No Effects	Not evaluated, not present and no potential habitat in project area.

The Area Plan contains standards that either directly or indirectly provide protection for sensitive species and their habitats on Land Between the Lakes. Area Plan Standards are specifically intended to be used by the Forest Service to manage the way all future actions are implemented to reduce or eliminate potential adverse effects to species. Area Plan Standards are listed on pp. 75-82 of the Area Plan. All Area Plan Standards are binding (i.e. they would be applied to all applicable actions), and guide actions on Land Between the Lakes, including the proposed actions. Pertinent to this project area, there are standards regulating soil and water resources and wildlife and their habitat.

Management Indicator Species

We evaluated all twelve Management Indicator Species for the Fox Hollow project area. Management Indicator Species are assessed as indicators for a guild of species in relation to their habitat types, as listed in Table 6 and Table 7.

Table 6. Management Indicator Species for Land Between the Lakes National Recreation Area

Management Indicator Species for Land Between the Lakes.		
Scientific name	**Common name**	**Habitat Indicator of:**
Apios priceana	Price's potato bean	Federally threatened species and habitat recovery
Dryocopus pileaus	Pileated woodpecker	Snags within forests
Sialia sialis	Eastern bluebird	Snags within open areas
Empidonax virescens	Acadian flycatcher	Mature forest within riparian areas
Dendroica discolor	Prairie warbler	Oak woodlands
Myiarchus crinitus	Great-crested flycatcher	Mature open oak forest
Hylocichla mustelina	Wood thrush	Mesophytic and riparian forests with complex canopy structure and mature forest interior
Sternella magna	Eastern meadowlark	Grassland
Colinus virginiana	Northern bobwhite quail	Grassland, demand game species
Icteria virens	Yellow-breasted chat	All forest type regeneration
Sialia sialis	Eastern bluebird	Demand non-game species (wildlife viewing)
Meleagris gallopavo	Eastern wild turkey	Demand game species (hunting)
Odocoileus virginianus	White-tailed deer	Demand game species (hunting)

Alternative 1 – No Action and Alternative 2 – Modified Proposed Action

Direct, Indirect, and Cumulative Effects

The direct, indirect, and cumulative effects for the management indicator species in the Fox Hollow project are the same for the no action and action alternatives, as described in Table 7.

Table 7. Determination of Effects for Management Indicator Species

Determination of effects; direct, indirect, and cumulative effects for management indicator species.		
Species	**No Action Alternative 1**	**Modified Proposed Action Alternative 2**
Price's potato bean	No impacts - there is no potential habitat and none that would be created on karst topography in the project area.	No direct impacts and no measurable beneficial indirect and cumulative effects. This species does not occur on the site and there are no actions proposed that would create potential open forest canopy on karst topography that this species requires for growth.
Pileated woodpecker	No impacts – there is habitat in the project area but no actions proposed that would affect this habitat.	No direct impacts and may impact individuals indirectly with some trees being removed that would be potential forage/nest habitat; however the area affected is very small and will not have an overall negative effect on pileated woodpeckers or their potential habitat. No cumulative effects predicted from past, present, and reasonably foreseeable future actions in the area of Stewart County, Tennessee, on Land Between the Lakes.
Eastern bluebird – Snags within open areas and Non-game Demand wildlife viewing species	No impacts – there is known habitat in the project area adjacent to and within managed open lands; no actions proposed that would change current habitat quality and/or quantity.	No direct impacts and not likely to negatively or positively indirectly affect the Eastern bluebird with removal of trees for daylighting FS Road 220 and closure of FS Road 382. Habitat along FS Road 382 is not suitable habitat. The daylighting areas along FS Road 220 are not likely to be suitable habitat like the habitat that occurs adjacent and within open lands along FS Road 219. With no direct or indirect effects from this alternative along with past, present, and reasonably foreseeable future management actions within the Stewart County, Tennessee, area of Land Between the Lakes, there is no measurable cumulative change in habitat predicted for the Eastern bluebird.
Acadian flycatcher	No impacts – there is habitat in the project area but no actions proposed that would affect this habitat.	No impacts – there is habitat in project area but no actions proposed that would affect this habitat.

Determination of effects; direct, indirect, and cumulative effects (Continued).		
Species	**No Action Alternative 1**	**Modified Proposed Action Alternative 2**
Prairie warbler	No impacts – there is very limited potential habitat in association with approximately 7 acres of managed open lands (old fields/grassland types). No actions to create more potential habitat.	No impacts – there is very limited potential habitat in association with approximately 7 acres of managed open lands (old fields/grassland types). No actions to create more potential habitat.
Great-crested flycatcher	No impacts – there is habitat in the project area in open oak forests that are associated with road and utility corridors, managed open lands, and Lake Barkley shoreline. There are no actions proposed to change habitat for this species.	No direct effects and some positive indirect effects from daylighting along FS Road 220. The great-crested flycatcher is associated with open oak forests; thus removal of a few trees will create more open canopy conditions and will be beneficial to this species if there is a suitable cavity tree for nesting nearby. Potential cavity nesting trees for this species may be indirectly affected if they are deemed a public safety hazard along the road corridor and need to be taken down. Overall the proposed action along with past, present and reasonably foreseeable future actions within the Stewart County, Tennessee, portion of Land Between the Lakes will have no measurable cumulative effects on the great-crested flycatcher.
Wood thrush	No impacts – there is habitat in the project area but no actions proposed that would affect this habitat.	No impacts – there is habitat in project area but no actions proposed that would affect this habitat.
Eastern meadowlark	No Impacts – no known potential habitat within the project area.	No impacts - no known potential habitat in project area and none that would be created and maintained. Ongoing open lands management within the project area is not desirable habitat for this species that prefers short to medium size grasses.
Northern bobwhite quail	No impacts – there is limited potential habitat in association with approximately 25 acres of managed open lands. No actions to create more potential habitat.	No impacts – there is limited potential habitat for this species in association with approximately 25 acres of managed open lands. No actions to create more potential habitat. The daylighting along FS Road 220 is not predicted to create sufficient desirable early successional habitat for the Northern bobwhite quail.

Determination of effects; direct, indirect, and cumulative effects (Continued).		
Species	**No Action Alternative 1**	**Modified Proposed Action Alternative 2**
Yellow-breasted chat	No impacts – there is very limited potential habitat in association with approximately 4 acres of managed open lands (old fields). No actions to create more potential habitat.	No impacts – there is very limited potential habitat for this species in association with approximately 4 acres of managed open lands (old fields). No actions to create more potential habitat. The daylighting along FS Road 220 is not predicted to create sufficient desirable forest regeneration habitat for the yellow-breasted chat.
Eastern wild turkey	No impacts – there is habitat in the project area but no actions proposed that would affect this habitat.	No impacts – there is habitat in the project area but no actions proposed that would affect this habitat.
White-tailed deer	No impacts – there is habitat in the project area but no actions proposed that would affect this habitat.	No impacts – there is habitat in the project area but no actions proposed that would affect this habitat.

Migratory Birds

We have seventeen migratory bird species of viability concern (Table 8) and eight management indicator migratory bird species listed in Table 6 and Table 7 above. The wood thrush and prairie warbler are in both of these groups. All of these migratory birds are covered by Executive Order 13186 of the Migratory Bird Treaty Act Memorandum of Understanding with the U.S. Fish and Wildlife Service (as amended in 2016). The Act does not cover the Northern bobwhite quail and Eastern wild turkey. Since the effects of the alternatives have already been discussed above for the migratory bird management indicator species, only the effects for migratory bird species of viability concern will be covered in this section. The Migratory Bird Treaty Act Executive Order 13186 provides for the protection and conservation of biological diversity for migratory birds in the United States

(https://energy.gov/nepa/downloads/eo-13186-responsibilities-federal-agencies-protect-migratory-birds-2001).

Table 8. Habitat Association for Bird Species of Viability Concern

Habitat Association for Bird Species of Viability Concern		
Bird Species of Viability Concern	**Scientific Name**	**Habitat Association[1]**
Sharp-shinned hawk	*Accipiter striatus*	2; 5; and 8
Bald eagle	*Haliaeetus leucocephalus*	17; 22; and 26
Osprey	*Pandion haliaetus*	17; 22; and 26
Little blue heron	*Egretta caerulea*	19; 24; 25; and 26
Black-crowned night heron	*Nycticorax nycticorax*	13; 22; 24; and 25
Barn owl	*Tyto alba*	4; 16; and 21
Whip-poor-will	*Caprimulgus vociferous*	5; 8; 11; and 13
Red-headed woodpecker	*Melanerpes erythrocephalus*	2 and 17
Bewick's wren	*Thryomanes bewickii*	2; 14; and 17
Wood thrush	*Hylocichia mustelina*	8; 10; and 11
Cerulean warbler	*Dendroica cerulean*	8; 11; and 13
Prairie warbler	*Dendroica discolor*	4 and 14
Blue-winged warbler	*Vermivora pinus*	14
Swainson's warbler	*Limnothlypis swainsonii*	8; 13; and 15
Worm-eating warbler	*Helmitheros vermivorus*	8 and 10
Louisianna waterthrush	*Seiurus motacilla*	8; 12; and 25
Henslow's sparrow	*Ammodramus henslowii*	21

[1]**Habitat Associations:** 1) Upland Forest; 2) Forest Opening; 3) Xeric and Dry Open Forest; 4) Xeric and Dry Grassland and Woodland; 5) Pine Forest; 6) Calcareous Cliffs and Talus; 7) Limestone Soil; 8) Interior Forest; 9) Mesic Forest; 10) Mesic Closed Canopy Forest; 11) Mesic Forest Opening; 12) Riparian Forest; 13) Riparian Forest Opening; 14) Regenerating Forest Associates; 15) Canebrake; 16) Den Tree; 17) Snag; 18) Downed Wood; 19) Mudflat; 20) Springs and Seeps; 21) Wet Grassland; 22) Lakeshores; 23) Rocky Shores and Bars; 24) Ponds and Marshes; 25) Streams; and 26) Lakes (From Area Plan FEIS Appendix E, Table E3).

Alternative 1 – No Action and Alternative 2 – Modified Proposed Action

Direct, Indirect, and Cumulative Effects

The migratory bird species of viability concern in Table 5 are associated with many of the habitat types found across Land Between the Lakes. Alternative 1 will have no impact on any of these migratory birds as there are no actions proposed. Alternative 2 will have no measurable effects on any of the seventeen migratory birds. The proposed daylighting along Forest Service Road 220 will not create sufficient desirable habitat conditions for species that are associated with open forest canopy conditions (i.e. bald eagle, barn owl, red-headed woodpecker, prairie warbler, blue-winged warbler, and Henslow's sparrow). Closure of Forest Service Road 382 within a closed canopy forest and adjacent bay area is not predicted to have a measurable positive change in bird use for this part of the project area.

Cultural Resources

Alternative 1 – No Action

Direct, Indirect, and Cumulative Effects

It is the determination of the Heritage Program at Land Between the Lakes that, through proper planning and heritage resource monitoring, that the road maintenance of the no action alternative will not negatively impact the heritage resources of the area.

In fact, the collaborative process helped further our understanding of the unique and important heritage of the area. It also helped us build an important relationship with the descendants of the former inhabitants. Out of this new found relationship, we gained important information about the people who once lived in this area. Additionally, collaborative efforts will continue into the future with plans to clean up Nolin Cemetery, conduct ground penetrating radar survey of the cemetery to identify possible remaining graves, and to place a new Nolin Cemetery sign (with the correct spelling) at the newly determined correct location.

Alternative 2 – Modified Proposed Action

Direct, Indirect, and Cumulative Effects

Road 382 is a dirt road with long term erosion and drainage problems. Boulders would be placed at the intersection of Road 382 and Road 219 to permanently block access to closed Road 382. Staff found no artifacts during survey of the north side of Road 382 therefore there are no direct, indirect, or cumulative effects.

Roads 219 and 220 existed in the historic period and many of the documented heritages sites are located along these roads in the Fox Hollow project area. These sites contain historic trees that add character and context to the historic location. These trees should not be removed as it would impact the heritage sites. Exclusion zones identified during the heritage surveys will be avoided during any daylighting activities. No heritage sites will be impacted by the proposed daylighting undertaking along Road 220 because the six daylighting areas illustrated in the map in Figure 3 do not contain any trees within known heritage sites.

It is the determination of the Heritage Program at Land Between the Lakes that, through proper planning and heritage resource monitoring, that the undertakings in Alternative 2 of the Fox Hollow project will not negatively impact the heritage resources of the area.

As noted under Alternative 1 above, the process helped further our understanding of the unique and important heritage of the area. It also helped us build an important collaborative relationship with the descendants of the former inhabitants. Out of this new found relationship, we gained important information about the people who once lived in this area. Additionally, collaborative efforts will continue into the future with plans to clean up Nolin Cemetery, conduct ground penetrating radar survey of the cemetery to identify possible remaining graves, and to place a new Nolin Cemetery sign (with the correct spelling) at the newly determined correct location.

Climate Change

Alternative 1 - No Action Alternative

Direct and Indirect Effects

There are no measurable effects of the no action alternative to climate change.

Climate change can result in more disturbance events such as wind storms, heavy rain and flooding, and ice storms. The increase in extreme weather patterns may lead to damage to vegetation, soils erosion, and unanticipated road maintenance. The forest will be less resilient to storm damage over time without active management because the forest will eventually become closed canopy and the trees will be the same age.

The no action alternative does not measurably affect carbon storage in vegetation and soils, amount of biomass, or release of carbon dioxide to the atmosphere.

Cumulative Effects

There are no cumulative effects of the no action alternative on climate change. There are no cumulative effects from climate change on the no action alternative.

Alternative 2 - Modified Proposed Action Alternative

Direct and Indirect Effects

There are no measurable effects of the modified proposed action alternative to climate change.

Climate change can result in more disturbance events such as wind storms, heavy rain and flooding, and ice storms. The increase in extreme weather patterns may lead to damage to vegetation, soils erosion, and unanticipated road maintenance. Closing Road 382 will not measurably decrease damage to roads from extreme weather in the project area. The forest will be less resilient to storm damage over time without active management because the forest will eventually become closed canopy and the trees will be the same age.

The modified proposed action alternative does not measurably affect carbon storage in vegetation and soils, amount of biomass, or release of carbon dioxide to the atmosphere.

Cumulative Effects

There are no cumulative effects of the modified proposed action alternative on climate change. There are no cumulative effects from climate change on the modified proposed action alternative.

Agencies and Persons Consulted

The Forest Service consulted the following individuals, Federal, State, tribal, and local agencies during the development of this environmental assessment:

Federal, State, and Local Agencies:

- United States Fish and Wildlife Service
- The Tennessee Division of Archaeology

Tribes:

- Absentee-Shawnee Tribe of Indians in OK
- Cherokee Nation
- Chickasaw Nation
- Eastern Band of Cherokee Indians
- Eastern Shawnee Tribe of Oklahoma
- United Keetoowah Band of Cherokee

Others:

- Representative of Fox Hollow Descendent Community
- Land Between the Lakes National Recreation Area Scheduled of Proposed Actions Email List
- Land Between the Lakes National Recreation Area Advisory Board
- Land Between the Lakes National Recreation Area Land Management Partners
- Fox Hollow Collaborative Meeting Groups

References

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